

Spot Safety Project Evaluation

Project Log # 200704288

Spot Safety Project # 07-02-202

**Spot Safety Project Evaluation of the Flasher Installation
At the Intersection of SR 1005 (Greensboro-Chapel Hill Rd) and
SR 2369 (Sylvan School Rd)/ SR 2371 (Pleasant Hill Church Rd)
Alamance County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Brad D. Robinson, EI

10/7/2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-02-202 – The Intersection of SR 1005 (Greensboro-Chapel Hill Rd) at SR 2369 (Sylvan Rd) and SR 2371 (Pleasant Hill Church Rd) in Alamance County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead warning flasher. The subject intersection is a four-leg intersection which was controlled by stop signs on southbound SR 1005 (Greensboro-Chapel Hill Rd) and SR 2371 (Pleasant Hill Church Rd). All approaches are single lane. The speed limits are 55 mph on SR 2371 (Pleasant Hill Church Rd) and southbound SR 1005 (Greensboro-Chapel Hill Rd) and 35 mph on eastbound SR 1005 (Greensboro-Chapel Hill Rd) and SR 2369 (Sylvan School Rd)

The original statement of problem was that the intersection was experiencing angle type crashes. The initial crash analysis was completed from January 1, 1998 to December 31, 2000 with a total of eleven reported crashes, eight of which were deemed correctable by the chosen countermeasure. The final completion date for the improvement at the subject intersection was on November 11, 2002 with a total cost of \$5,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from October 1, 2002 through December 31, 2002. The before period consisted of reported crashes from April 1, 1997 through September 30, 2002 (5 years, 6 months) and the after period consisted of reported crashes from January 1, 2003 through June 30, 2008 (5 years, 6 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	17	5	-70.6
Total Severity Index	4.48	2.48	-44.6
Target Crashes	13	3	-76.9
Target Crash Severity Index	4.42	3.47	-21.5
Volume	2000	2500	25.0
<u>Injury Crash Summary - Total</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	3	0	-100.0
Class C Injury Crashes	5	1	-80.0
Total Injury Crashes	9	4	-55.6

The naive before and after analysis at the treatment location resulted in a 71 percent decrease in Total Crashes, a 77 percent decrease in Target Crashes, and a 45 percent decrease in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 2005.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 71 percent decrease in Total Crashes and a 77 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is 18.67 considering total crashes. The benefit to cost ratio considering only target crashes is 14.05. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Referencing the *Collision Diagrams*, and the above table it appears that the flasher was effective at reducing Frontal Impact Crashes at the intersection. In the before period there was a pattern of 5 Angle Crashes between southbound SR 1005 vehicles and eastbound SR 1005 vehicles. This pattern was eliminated in the after period. A second Angle Crash pattern existed in the before period between northbound SR 2731 vehicles and westbound SR 2369 vehicles. This pattern was reduced by 63 percent (from 8 to 3).

After examining crash reports it appears that one crash in the before was the result of a vehicle running the stop sign (crash #1). There were no crashes resulting from a vehicle running a stop sign in the after period.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1005 at SR 2369/2371
 COUNTY: Alamance
 FILE NO.: SS 07-02-202

BY: BDR
 DATE: 10/3/2008

DETAILED COST: TYPE IMPROVEMENT - **Shoulder Guardrail**

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$5,000	10	0.149	\$745
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$400
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$350
TOTAL ANNUAL COST=	\$1,495
TOTAL COST OF PROJECT=	\$5,000

COMPREHENSIVE COST REDUCTION:

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	5.50	0	0.00	8	1.45	9	1.64	\$34,345
AFTER	5.50	0	0.00	1	0.18	4	0.73	\$6,436

Annual Benefits from Crash Cost Savings \$27,909

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$26,414

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 18.67

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 18.67

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1005 at SR 2369/2371
 COUNTY: Alamance
 FILE NO.: SS 07-02-202 Target Crashes

BY: BDR
 DATE: 10/3/2008

DETAILED COST: TYPE IMPROVEMENT - Shoulder Guardrail

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$5,000	10	0.149	\$745
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$5,000	10	0.149	\$745

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$350
 TOTAL ANNUAL COST= \$1,495
 TOTAL COST OF PROJECT= \$5,000

COMPREHENSIVE COST REDUCTION:

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	5.50	0	0.00	6	1.09	7	1.27	\$25,945
AFTER	5.50	0	0.00	1	0.18	2	0.36	\$4,945

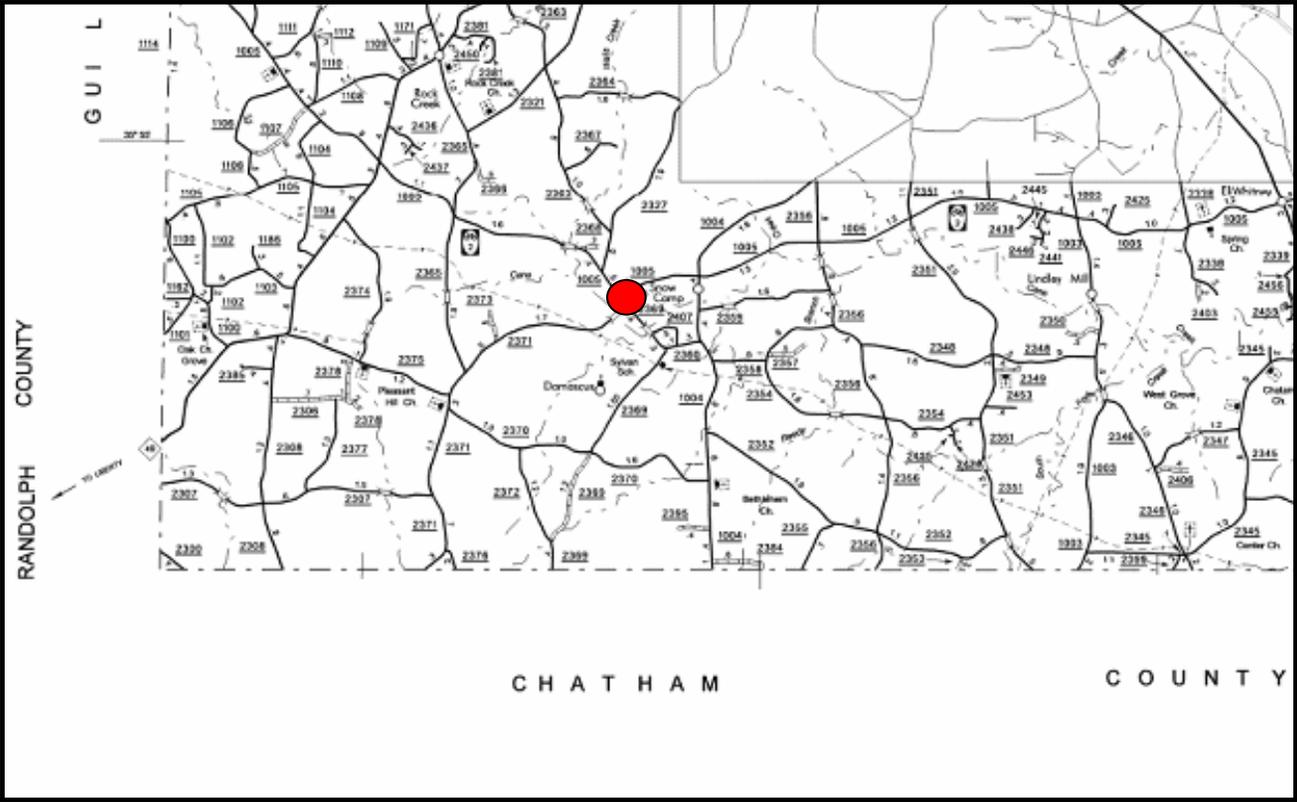
Annual Benefits from Crash Cost Savings \$21,000

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$19,505

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 14.05

TOTAL COST OF PROJECT - \$5,000 COMPREHENSIVE B/C RATIO - 14.05

Location Map
Alamance County
Evaluation of Spot Safety Project #07-02-202



Treatment Site Location: SR 1005 (Greensboro-Chapel Hill Rd) at SR 2369/2371 (Sylvan School/Pleasant Hill Church Rd)

Treatment Site Photos Taken February 18, 2008



Traveling East on SR 1005 (Greensboro-Chapel Hill Rd)



Traveling West on SR 2369 (Sylvan School Rd)

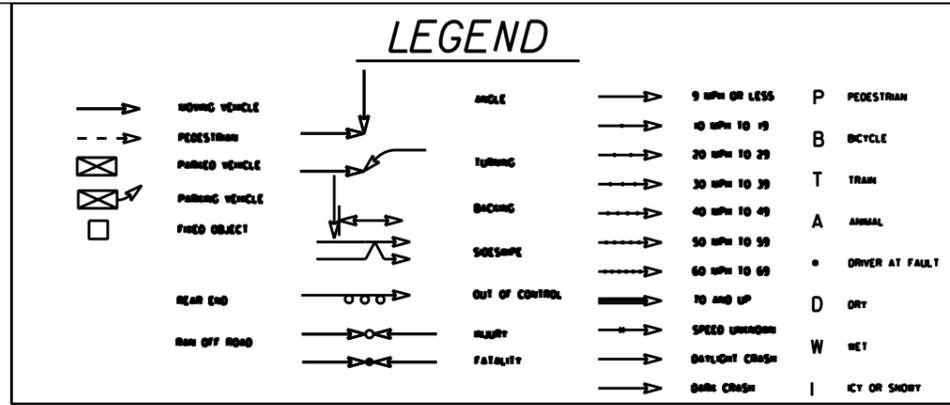


Traveling North on SR 2371 (Pleasant Hill Church Rd)



Traveling South on SR 1005 (Greensboro-Chapel Hill Rd)

Alamance County
 SR 1005 (Greensboro-Chapel Hill Rd)
 at SR 2369/2371
 (Sylvan/Pleasant Hill Church)
 In the Before Period
 From 4/1/1997-9/30/2002



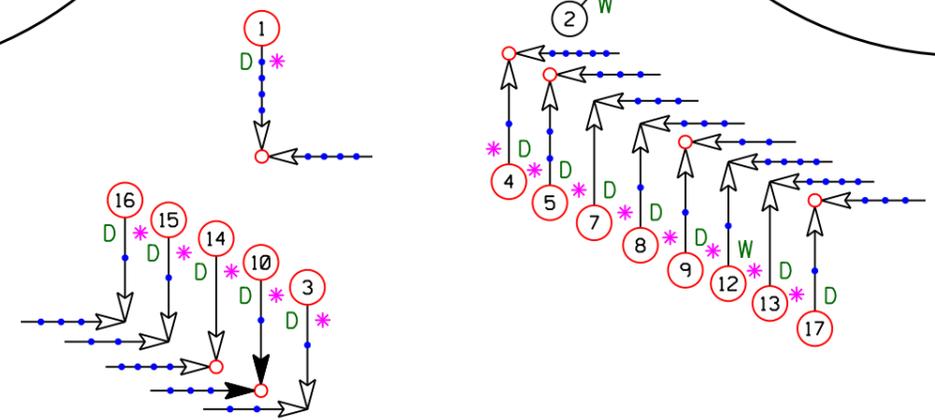
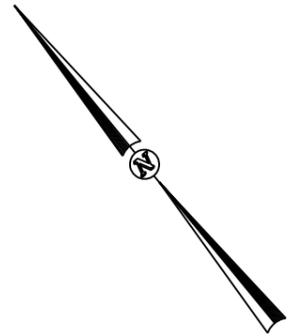
SR 1005
 (Greensboro Chapel Hill)
 35 mph

SR 1005
 (Greensboro Chapel Hill)
 55 mph



SR 2371
 (Pleasant Hill Church)
 55 mph

SR 2369
 (Sylvan School)
 35 mph



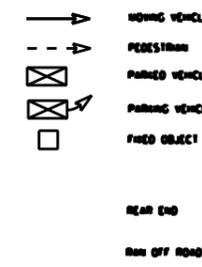
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT <small>HIGHWAY SAFETY IMPROVEMENT PROGRAM</small>		COLLISION DIAGRAM <small>SAFETY INFORMATION MANAGEMENT AND SUPPORT</small>	
		DIVISION: I	AREA: ..
		STUDY PERIOD: 4/1/1997 TO 9/30/2002	DISTANCE: Y-LINE: 150 FT
SAFETY EVALUATION		TRAFFIC SAFETY	
BEFORE FLASHER INSTALLATION		SCALE: NOT TO SCALE	DATE: October 2008
		LOG NUMBER: 200704288	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRANSPORTATION MOBILITY AND SAFETY DIVISION			

Alamance County
 SR 1005 (Greensboro-Chapel Hill Rd)
 at SR 2369/2371
 (Sylvan/Pleasant Hill Church)
 In the After Period
 From 1/1/2003-6/30/2008

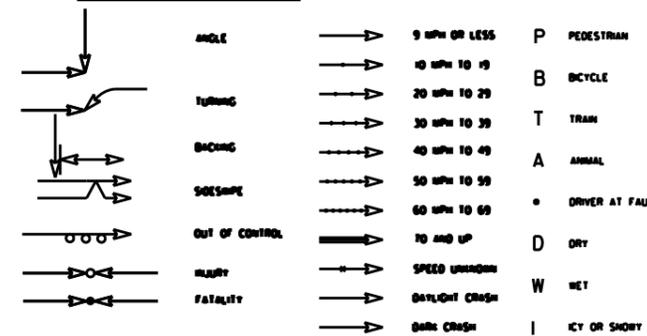


SR 1005
 (Greensboro Chapel Hill)
 35 mph

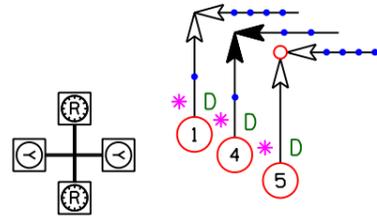
SR 1005
 (Greensboro Chapel Hill)
 55 mph



LEGEND



- 9 mph or less P PEDESTRIAN
- 10 mph to 19 B BICYCLE
- 20 mph to 29 T TRAM
- 30 mph to 39 A ANIMAL
- 40 mph to 49
- 50 mph to 59
- 60 mph to 69
- 70 and up D DRIVER AT FAULT
- SPEED UNKNOWN W WET
- Other Crash I ICY OR SNOWY



SR 2369
 (Sylvan School)
 35 mph

SR 2371
 (Pleasant Hill Church)
 55 mph



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT <small>HIGHWAY SAFETY IMPROVEMENT PROGRAM</small>		COLLISION DIAGRAM <small>SAFETY INFORMATION MANAGEMENT AND SUPPORT</small>	
		DIVISION: I	AREA: ..
		STUDY PERIOD: 1/1/2003 TO 6/30/2008	DISTANCE: Y-LINE: 150 FT
SAFETY EVALUATION		TRAFFIC SAFETY	
AFTER FLASHER INSTALLATION		SCALE: NOT TO SCALE	DATE: October 2008
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